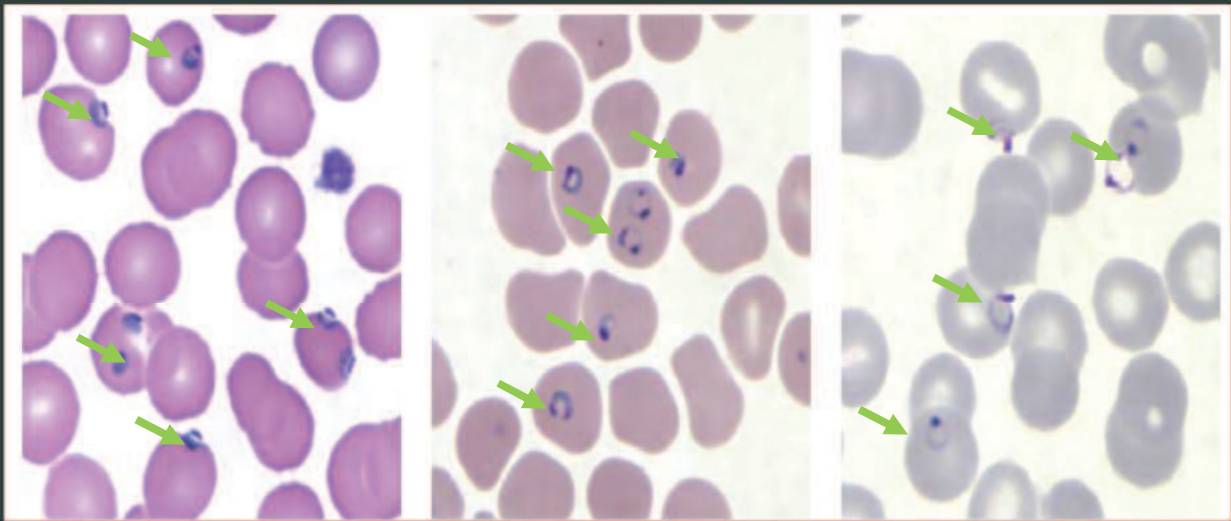


AI 影像辨識: 瘧疾血片自動判讀

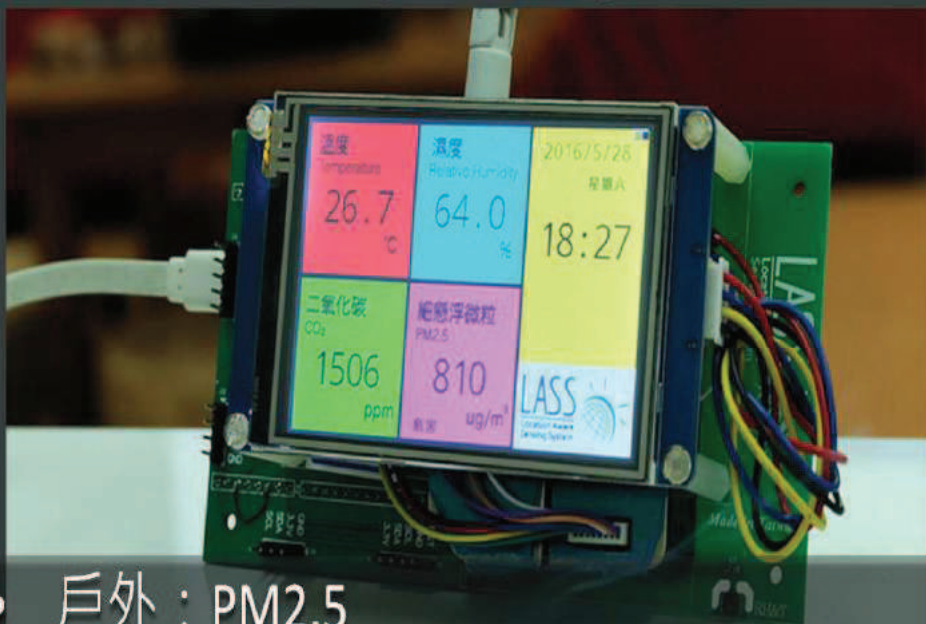


- 加速瘧疾診斷
- 解決血片專家不足的問題

<https://www.cdc.gov/dpdx/malaria/dx.html>

16

IoT: 環境感測監測 (LASS社群)



- 戶外：PM2.5
- 戶內：CO₂

Source: https://c2.staticflickr.com/8/7422/27570438996_9189b8a7ec_z.jpg

17



智慧系統與晶片產業發展策略會議

《智慧科技於防疫之應用》

引言人

彰化基督教醫院/郭守仁院長

1

智慧系統與晶片產業發展策略會議
~智慧科技應用~

智慧科技於防疫之應用

彰化基督教醫院

與談人 郭守仁 院長

2017年7月12日



創院沿革

- 本院於西元1896年由英國傳教士梅鑑霧牧師及蘭大衛醫師所創。
- 創設百餘年來均秉持耶穌基督救世博愛的精神，提供以病人為中心、國際級醫療專業服務。



蘭大衛醫師夫婦



蘭大弼醫師夫婦



CHANGHUA CHRISTIAN HOSPITAL ²

臺灣現代醫療之先驅



創辦人 蘭大衛醫師

1896年彰化基督教醫院前身



CHANGHUA CHRISTIAN HOSPITAL ³

西元1896年創立以來 一路成長



1907年興建之二層樓院舍

彰基總院院區全貌



中台灣唯一具有百年歷史的醫學中心



CHANGHUA CHRISTIAN HOSPITAL 4

以愛傳承-建構完整的醫療服務網

台灣彰化基督教醫療財團法人醫療體系
The Changhua Christian Medical Foundation Healthcare System, TAIWAN
彰化市50866南英街135號 電話：(04)723-6385 133 Nan-iao Street, Changhua, TAIWAN 50866 Tel: (04)723-6385

醫療 · 傳道 · 服務 · 教育 · 研究
Medical Care · Evangelism · Service · Education · Research

1896.11 中華路院區
Chunghua Road Campus

1983.12 二林基督醫院
Erin Christian Hospital

2003.05 南基醫院
Nantou Christian Hospital

2006.09 鹿港基督醫院
Lukang Christian Hospital

2008.06 佑民醫院
Yumin Hospital

2008.03 雲林基督醫院
Yulin Christian Hospital

2014.08 兒童醫院
Children's Hospital

2015.07 興林基督醫院
Yuanlin Christian Hospital

2017.03 漢銘醫院
Han-Ming Hospital

2016.07 鹿基醫院長青院區
Lukang Christian Hospital Evergreen Campus

1896.11 彰化基督醫院
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Bio-Kil自動防疫技術

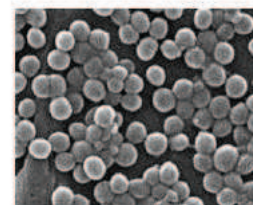


可消滅之微生物

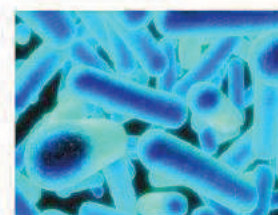
以下列出已試驗證實可消滅之微生物：

■ Bacteria 細菌

- *MRSA* 抗藥性金黃色葡萄球菌
- *Mycobacterium tuberculosis* 結核桿菌
- *Staphylococcus aureus* 金黃色葡萄球菌
- *Legionella pneumophila* 退伍軍人菌
- *Escherichia coli* (=E. Coli) 大腸桿菌
- *Salmonella typhimurium* 沙門氏桿菌
- *Listeria monocytogenes* 李斯特菌
- *Pseudomonas aeruginosa* 綠膿桿菌
- *Klebsiella pneumoniae* 肺炎桿菌



電子顯微鏡下的抗藥性金黃色葡萄球菌 (MRSA)



退伍軍人桿菌

■ Fungus 真菌

- *Trichophyton mentagrophytes* 鬚髮癬菌





2002年日內瓦發明獎金牌



2005年德國紐倫堡發明獎銅牌



2002年臺灣發明展金頭腦獎



2014年台北生技獎



2010年法國巴黎發明獎金牌



2012年法國巴黎發明獎銅牌



2013年法國巴黎發明獎銅牌



2014年法國巴黎發明獎銅牌

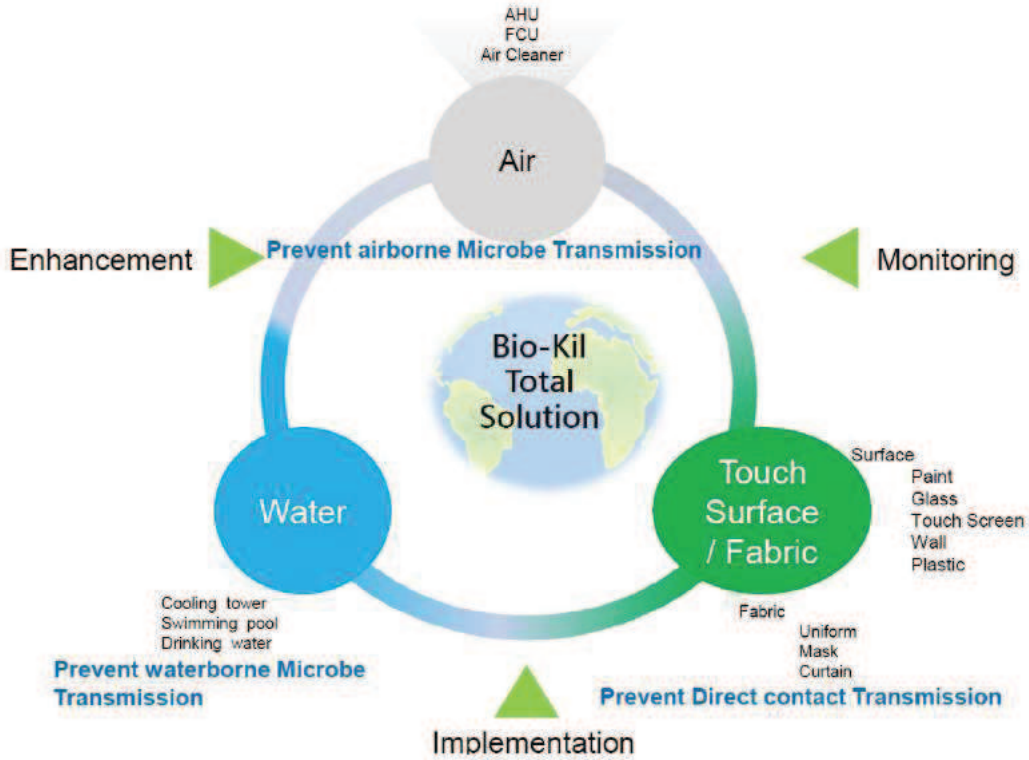


學術論文及專利

多國16項專利



Bio-Kio防疫平台應用領域



彰化基督教醫院



■台灣彰化基督教醫院體系引進Bio-Kil防疫系統，客製化進行各項防疫服務。



退伍軍人菌 防治	空氣中總菌數 監控	潔淨環境服務
<ul style="list-style-type: none"> • 加護病房 (ICU) 	<ul style="list-style-type: none"> • 加護病房 (ICU) • 門診候診區 	<ul style="list-style-type: none"> • 手術室

有效改善微生物含量
預防院內感染



新加坡樟宜國際機場



BCA GREEN MARK FOR BUILDINGS AWARD ★ Gold

Singapore Changi Airport Terminal 2
(Existing Non-Residential Buildings)

Building Owner Changi Airport Group (S) Pte Ltd	ESCO United Premises Limited
Facility Management Changi Airport Group (S) Pte Ltd	ESD Consultant United Premises Limited



Key Features

- Estimated energy savings: 2671,848 kWh/yr; Estimated water savings: 96,141 m³/yr
- Heat recovery system for domestic hot water supply.
- Photocells sensors for skylight areas and motion sensors for offices and toilets.
- UV emitters and Bio-Kil products at all Air Handling Stations (AHS).
- Use of carpark guidance system.

在空調系統應用Bio-Kil防疫技術
在2011年獲得綠色建築標誌金獎



陳篤生醫院

Bio-Kil technology has scored points in key areas for Green Mark.

- Effectively Improve Indoor Environmental Quality
- New Innovation
- 亞太抗熱(SARS)防疫中心
新加坡陳篤生醫院已啟用 Bio-Kil，並在2006年獲得綠色建築標誌最高榮譽白金獎 (Green Mark Platinum Award)

The Green Mark scheme was introduced in 2005 to ensure the environmental friendliness and water conservation measures which set them apart from other buildings. They have environmental quality is provided for their users.

Green Mark Platinum

Improved indoor air quality by applying "Bio-Kil" technology onto air con filter to eliminate bacteria and virus.

Project Manager	• CHH In-house Facilities Engineering Department
Controls and Energy Systems	• CHH Group Ltd

Key Green Features

- Use of "clean and renewable hydrogen fuel cell technology" as emergency back-up power source energy
- Improved indoor air quality by applying "Bio-Kil" technology onto air-con filter to eliminate bacteria and virus
- Redesigned operating theatre air-con control system to allow staff to switch from "full operation" mode to "snooze" mode when operating theatres are not in use. This innovation won the SPRING Singapore Star Award in 2004 and could save T\$1m more than \$120,000 per year.
- Installed heat exchanger to extract air-con package system's waste heat to supply hot water to the kitchen.
- Use of dual sensor (CO₂ & temperature) system to control the basement carpark mechanical ventilation, saving more than \$200,000 per year on energy cost and prolong equipment life.
- Progressive replacing conventional T8 lighting fittings with compact and brighter T5 light fittings, hence reducing the number of tubes required.

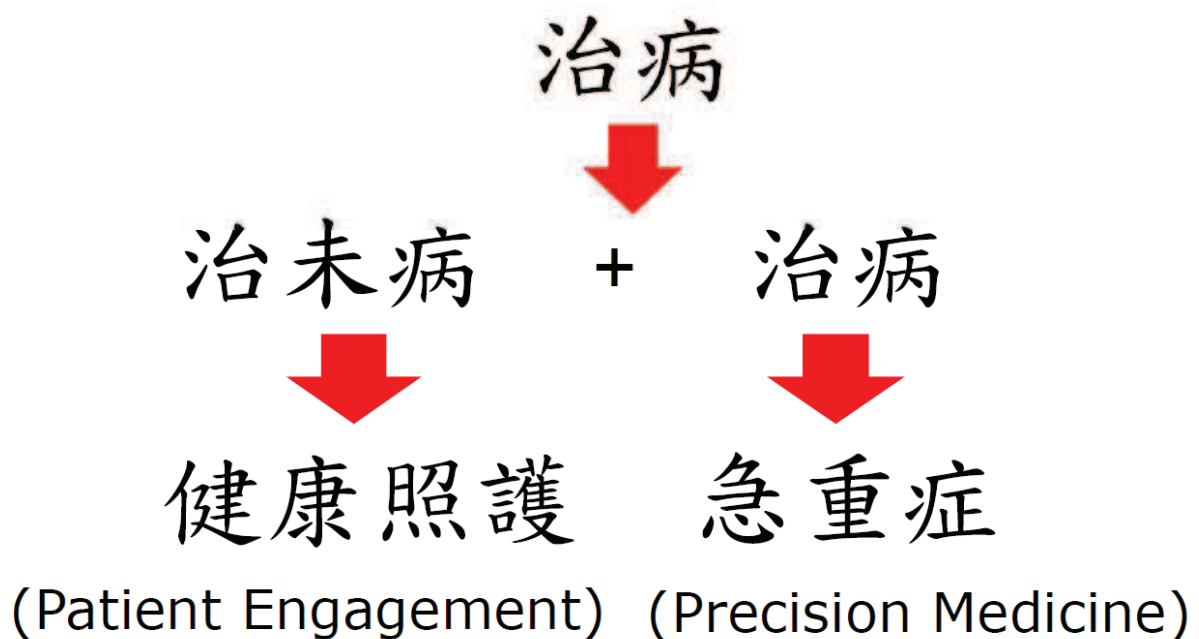
BCA AWARDS 2006

http://www.bca.gov.sg/GreenMark/green_mark_projects.html





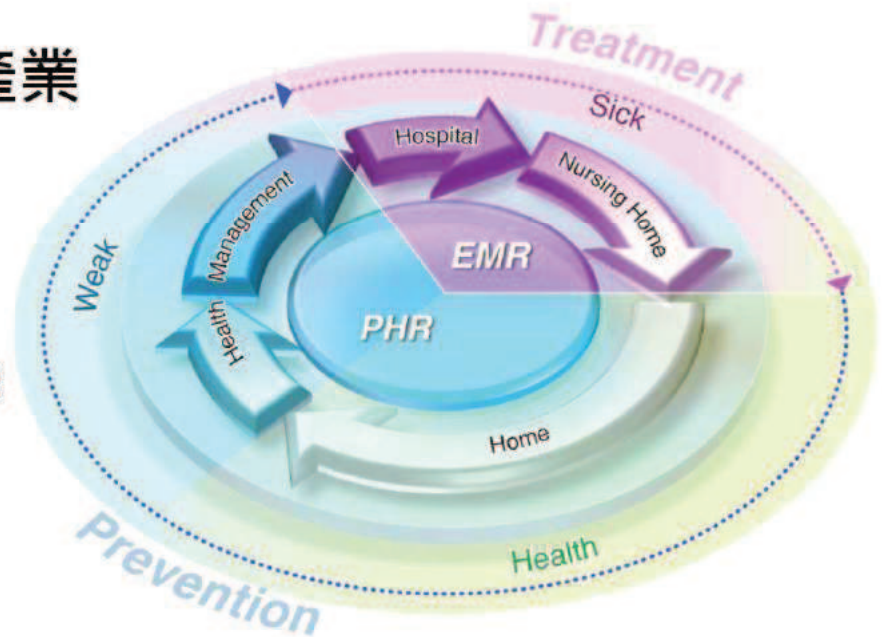
Hospital's role is changing.....



Patient Engagement

ICT在健康照護產業

- ✓ AI
- ✓ Robot
- ✓ IoT sensors
- ✓ Smart Phone



Precision Medicine

- Predictive
- Preventive
- Personalized
- Participatory

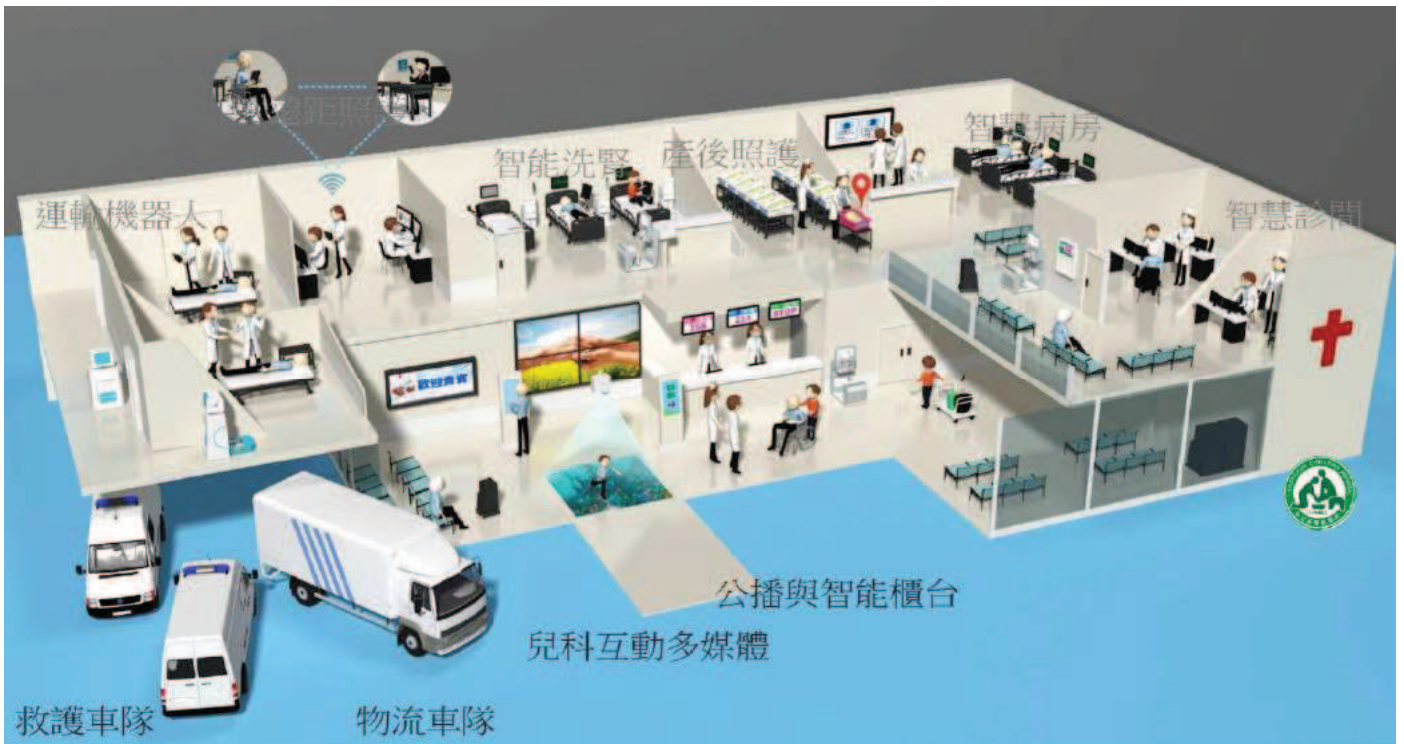


BRCA1基因突變: 乳腺癌機率87% 卵巢癌機率50%





醫療的智能化



醫療的自動化



- 治療革命
- 判讀輔助
- 臨床輔助
- 護理輔助
- 勞力取代



CHANGHUA CHRISTIAN HOSPITAL²⁰

照護的雲端化



醫事人員管理介面

專業醫療服務

遠距照護
系統

日常居家照護

病患個人健康管理APP

- 觀護用戶健康狀況
- 設計改善健康計劃
- 提供專業建議
- 不良狀況的警示及回應
- 輸出綜合報告
- 提高醫療品牌形象

- 關注健康趨勢
- 增進相關常識·分享知識
- 關注親屬好友身體健康
- 獲得專業建議
- 不良狀況的提示
- 改良生活型態
- 改善身體健康及體態



CHANGHUA CHRISTIAN HOSPITAL²¹

彰基走出去 世界走進來



CHANGHUA CHRISTIAN HOSPITAL²²



智慧系統與晶片產業發展策略會議

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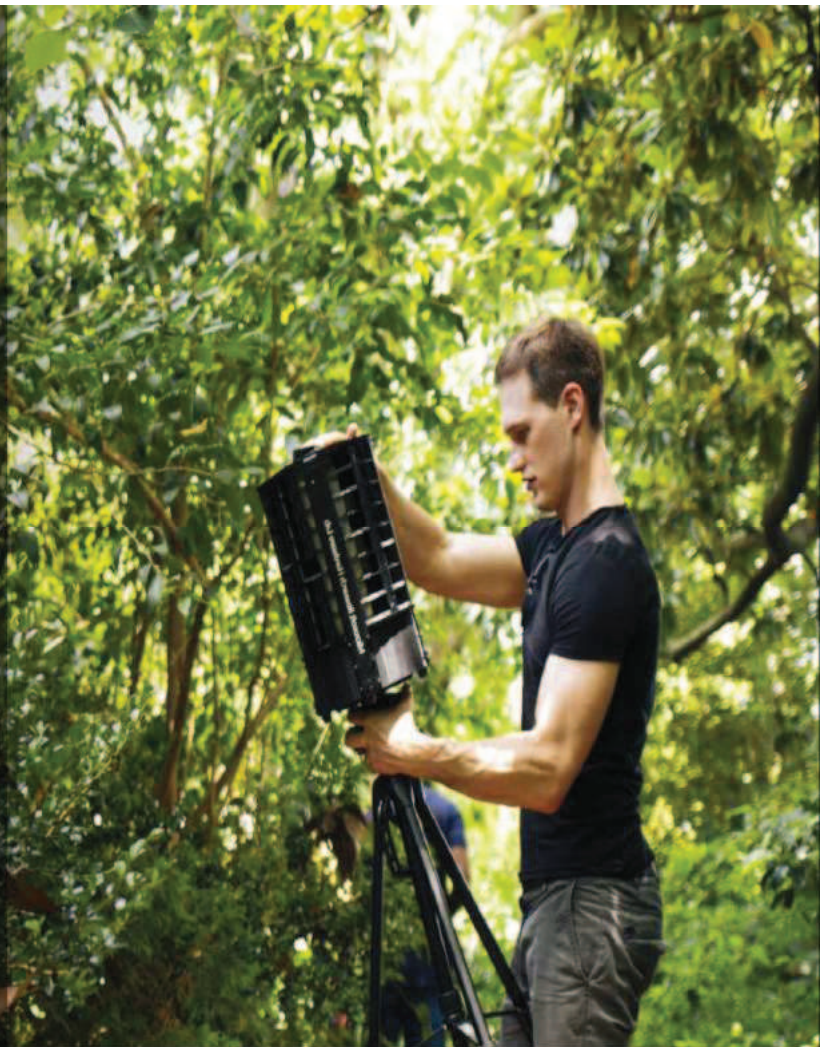
台灣微軟 / 丁維揚 策略長

微軟於疾病傳染領域 之應用分享

台灣微軟 Microsoft Taiwan

首席技術與策略長

Danny Ting



科技創新



大數據



雲



端



人工智慧

Project Premonition – 微軟研究項目幫助追蹤病毒傳播



The Threat of Disease Emergence

Emerging infectious diseases pose significant health and economic threats.

SARS in China (2003):

\$6.2 billion / **8000** = **\$775,000**
cost cases

H5N1 (2003-2009):

\$20 billion / **468** = **\$43 million**
cost cases

Ebola in US (2014):

\$2.8 billion / **4** = **\$700 million**
cost cases

Need Better Surveillance of Diseases

But surveillance of EIDs is particularly challenging because:

- Majority of threats caused by animal pathogens
Over 60% of emergence events
- Best existing systems detect outbreaks too late
Median delay of 13.5 days
- Many emerging diseases were previously unknown
Over 70% of viruses in wild are unknown

5

50

Actually Need Surveillance in The Environment

To see which pathogens are circulating in animals before they impact humans

6

Mosquito-as-a-Device

Use mosquitoes as devices that collect blood samples from animals in the wild



Mosquitoes grow naturally in rural and urban environments on every continent but Antarctica.

On average live 20 days, consume 2.5 μ l per blood meal, can fly several miles, and are geographically widely distributed. Their advanced olfactory systems to locate hidden prey.

7

Mosquito-as-a-Device

Use mosquitoes as devices that collect blood samples from animals in the wild



Mosquitoes sample the genes of animals and their pathogens

In studies, over 70% of viral pathogens in mosquitoes are unknown to science and come from a wide range of hosts, including humans, ducks, geese, cows, and plants.

8

Mosquito-as-a-Device

Use mosquitoes as devices that collect blood samples from animals in the wild



Can leverage classical entomological methods to catch mosquitoes

Classical field entomology has been used for decades to efficaciously surveil pathogens carried by mosquitoes. Must improve these methods to achieve necessary scale.

9

Key Innovations

54

A number of technological innovations are required for scalability



Smarter traps that automate field biology to capture wild mosquitoes

Existing mosquito traps are too low-throughput. They need to be placed by experts, remain in the environment for 12 – 18 hours, are heavy, and require manual processing.

10